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The Effects of Seasonal Temperature Variations on Growth Performance and Mortality Rates of Broilers in Commercial and Backyard Poultry Farms in Maiduguri, Nigeria

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Abstract:

This study investigates the effects of seasonal temperature variations on growth performance and mortality rates of broilers in commercial and backyard poultry farms in Maiduguri, Borno State, Nigeria. A comparative observational design monitored broilers over a year across three seasons: cold dry, hot dry, and rainy. Two hundred broilers, with 100 each from commercial and backyard farms, were randomly selected. Parameters such as average daily gain (ADG), feed intake, feed conversion ratio (FCR), and mortality rates were recorded weekly. Results revealed significant temperature fluctuations, with the hottest months from April to June (peaking at 40.5°C in May) and the coolest from October to February (lowest at 27.5°C in January). Further data analysis with SPSS revealed the highest average weight gain in commercial farms during the rainy season (1700 ± 180 grams), followed by the cold dry season (1600 ± 190 grams), and lowest in the hot dry season (1500 ± 200 grams). Backyard farms showed a similar trend with lower values. Feed intake and FCR varied significantly by season. In commercial farms, feed intake peaked in the cold dry season (4.5 ± 0.3 kg), with the best FCR in the rainy season (2.8 ± 0.2). The hot dry season had the highest FCR (3.0 ± 0.3) and lowest feed intake (4.0 ± 0.5 kg). Backyard farms followed similar patterns but were less efficient. Mortality rates were lowest in the rainy season (5.0 ± 0.8% for commercial, 10.0 ± 1.2% for backyard) and highest in the hot dry season (8.0 ± 1.0% for commercial, 12.0 ± 1.5% for backyard). Findings indicate significant effects of seasonal temperature on broiler performance and mortality, with commercial farms generally outperforming backyard farms. Improved management practices are needed to mitigate extreme temperature impacts, especially in backyard systems.

Keywords: temperature variations; broiler performance; mortality rates; poultry farms; maiduguri, borno state

Introduction

Poultry farming is a vital component of agriculture in developing countries, including Nigeria, providing a rich source of animal protein and serving as a crucial element of food security and livelihood for many poor households (Pius *et al*., 2021; Birhanu *et al*., 2023). In Maiduguri, Borno State, both commercial and backyard poultry farming are established (Lawal *et al*.,

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2016). Even though some poultry farmers in this region achieve significant success, they are often classified as backyard poultry farmers due to the relatively small flock sizes they manage (James *et al*., 2021).

However, the semi-arid climate of Maiduguri poses significant challenges to poultry production systems, particularly for broiler chickens (Akidarju *et al*., 2010; Makinta *et al*., 2019). This region experiences extreme temperature variations characterized by hot dry and cold dry seasons (Fantami *et al*., 2021; Kpomasse *et al*., 2021). High temperatures, especially, can induce heat stress in broilers, which are known for their rapid growth rates and sensitivity to environmental stressors (Nawaz *et al*., 2021; Apalowo *et al*., 2024). Heat stress can lead to reduced feed intake, poor growth performance, and increased mortality rates, severely impacting the profitability and sustainability of poultry farming (Gholamreza *et al*., 2019; Akinyemi and Adewole, 2021).

Numerous studies have highlighted the detrimental effects of heat stress on poultry production. For instance, Wasti *et al*. (2020) and Apalowo *et al*. (2024) demonstrated that broilers exposed to high temperatures exhibit reduced feed intake and growth rates. Similarly, Lara and Rostagno (2013) and Kpomasse *et al*. (2021) reviewed the impacts of heat stress on poultry and underscored its negative effects on production efficiency, including lower body weight gain and higher feed conversion ratios.

In the context of Nigeria, Elijah and Adedapo (2006) and Balogun *et al*. (2013) reported that high environmental temperatures significantly affect the physiological responses and performance of broilers. Furthermore, the works of Ogundeji (2022) and Abdullahi *et al*. (2023) emphasized that small-scale poultry farmers are particularly vulnerable to these adverse climatic conditions due to limited resources and adaptive capacity.

Despite these studies, there is a paucity of research specifically comparing the impacts of seasonal temperature variations on broilers in commercial versus backyard poultry farming systems in Maiduguri, Borno State. This comparative perspective is crucial for identifying specific vulnerabilities and developing tailored adaptive strategies to enhance resilience and productivity in different farming contexts.

This study aims to fill the gap in the literature by providing a comparative analysis of the effects of seasonal temperature variations on the growth performance and mortality rates of broilers in commercial and backyard poultry farms in Maiduguri, Borno State. By examining these effects, the study seeks to test the following hypotheses: H1 - Seasonal temperature variations significantly affect the growth performance of broilers in both commercial and backyard poultry farms; H2 - Mortality rates of broilers are higher during extreme temperature conditions in both commercial and backyard poultry farms; and H3 - The impact of seasonal temperature variations on broilers differs between commercial and backyard poultry farming systems due to differences in management practices and resources. These hypotheses aim to provide a comprehensive understanding of how environmental factors influence poultry farming in diverse settings.

To address these hypotheses, the study is guided by three research questions: How do seasonal temperature variations impact the growth performance of broilers in commercial and backyard poultry farms in Maiduguri, Borno State? What are the mortality rates of broilers in commercial and backyard poultry farms during different seasonal temperature conditions? How do commercial and backyard poultry farmers in Maiduguri, Borno State, adapt to and mitigate the effects of extreme temperature variations on broilers? Through these questions, the study will explore the specific challenges and adaptive strategies employed by poultry farmers, offering valuable insights for improving poultry farming practices under varying climatic conditions.

Understanding the specific impacts of seasonal temperature variations on broiler production in different farming systems is crucial for developing effective strategies to improve resilience and productivity. This study seeks to provide valuable insights that can inform targeted interventions and policies to support both commercial and backyard poultry farmers in Maiduguri, Borno State, in coping with climatic challenges.

Materials and Methods:

Study Area:

The present study was conducted in Maiduguri, capital of Borno State, located in the northeastern region of Nigeria. Maiduguri, also known as Yerwa, was founded in 1902 and is the largest metropolis in this region. The city is situated in the Arid Zone with an area of approximately 69,436 km². Geographically, Maiduguri lies between latitude 10° and 13° North and longitude 12° and 15° East, with more specific coordinates placing it at 11°48'N to 11°52'N and 13°02'E to 13°12'E.

Maiduguri is part of the Sahel Savannah Zone, characterized by low rainfall and a tropical continental climate. The city experiences a hot and dry climate for most of the year, with a rainy season extending from late June to early October in the north, and from May to October in the south. The mean annual rainfall is around 600-650 mm, with extreme northern areas receiving less than 500 mm. The average annual temperature is about 32°C.

The relative humidity in Maiduguri is generally low throughout the year, ranging from 13% during the driest months of February and March, to 70-80% during the peak of the rainy season in July and August. The dry season lasts between 4 to 8 months, typically from October to May, followed by a short but intense rainy period.

Maiduguri occupies a significant portion of the Chad Basin and shares international borders with the Republics of Niger to the north, Chad to the northeast, and Cameroon to the east. Within Nigeria, it borders Yobe State to the west.

This climatic and geographic profile of Maiduguri provides a unique environment for various agricultural and livestock activities, which are essential to the local economy and livelihoods. Maiduguri is characterized by a semi-arid climate with significant temperature variations throughout the year, making it an ideal location to study the influence of environmental temperatures on poultry.

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Study Design:

The study employed a comparative observational design to assess the impact of seasonal temperature variations on the growth performance and mortality rates of broilers in commercial and backyard farms in Maiduguri, Borno State. The study was conducted from December 2022 to November, 2023, encompassing three distinct seasons: cold dry (November to February), hot dry (March to May), and rainy (June to September).

Farm Selection Criteria

A stratified random sampling technique was used to select the farms for this study. Initially, a list of all commercial and backyard broiler farms within Maiduguri was compiled with the help of local agricultural offices. Farms were then categorized into commercial and backyard types. From each category, ten farms were randomly selected. This random selection process aimed to minimize selection bias and ensure a representative sample of the farming practices in the region. Farms were included in the study based on the following criteria:

1. Voluntary Participation: Farms that consented to participate in the study were considered.
2. Uniformity: Only farms raising broilers of the same breed and similar age groups were included to maintain uniformity in the study.

Sample Size and Broiler Selection

A total of 200 broilers were selected for the study, with 100 from commercial farms and 100 from backyard farms. Within each farm, broilers were selected randomly to ensure an unbiased representation. The broilers were of the same breed (e.g., Cobb 500) and were at the same age group (approximately one week old at the start of the study).

Data Collection

Data were collected over a one-year period to capture seasonal and annual variations. The following parameters were monitored and recorded:

1. Temperature Data: Daily ambient temperatures were recorded using digital thermometers installed in the poultry houses. Data loggers were also employed to record temperatures at different times of the day to capture variations.
2. Growth Performance: Growth performance parameters such as average daily gain (ADG), feed intake, and feed conversion ratio (FCR) were measured weekly. Weighing scales were used to measure the body weights of broilers.
3. Mortality Rates: Mortality was recorded daily. For each death, a post-mortem examination was conducted by a qualified veterinarian to determine the cause of death, categorizing it as temperature-related or due to other factors.

Control Variables:

To account for other environmental factors, additional data were collected: daily relative humidity levels were measured using hygrometers installed in the poultry houses; anemometers were used to record wind speeds daily; and light intensity was measured using lux meters to account for variations in natural light exposure.

Data Analysis:

Data were analyzed using SPSS software (version 26.0). Descriptive statistics, including mean, standard deviation, and range, were utilized to summarize the data. To determine the significance of seasonal variations on growth performance and mortality rates, Analysis of Variance (ANOVA) tests were employed to compare differences between seasons and farm types (commercial vs. backyard), with the significance level set at $p < 0.05$. When significant differences were found, post-hoc tests (e.g., Tukey's HSD) were conducted to identify specific group differences. Detailed comparative analyses between commercial and backyard farms were performed, considering additional environmental factors such as humidity, wind speed, and sunlight exposure to better elucidate the effects of management practices and environmental conditions. While temperature was the primary focus, other environmental factors were recorded and incorporated into the analysis to account for their potential impact on the results.

Results:

Temperature Fluctuations in and Around Broiler Chicken Poultry Pens and Farms in Maiduguri, Borno State, Nigeria

Table 1 presents the average monthly temperature fluctuations recorded in and around poultry pens and farms rearing broiler chickens in Maiduguri, Borno State, over a one-year survey period. The result show a clear pattern of seasonal temperature variations around poultry farms in Maiduguri. The results show a clear pattern of seasonal temperature variations around poultry farms in Maiduguri. The results indicate that the hottest months and highest temperatures occur from April to June, peaking in May at 40.5°C. The cooler months range from October to February, with temperatures between 27.5°C and 29.0°C, and January has the lowest average temperature of 27.5°C.

Month	Average Temperature (°C)
January	27.5
February	28.2
March	30.8
April	39.1
May	40.5
June	35.0
July	33.8
August	31.5
September	34.0
October	30.7
November	29.0
December	28.0

Table 1. Temperature Fluctuations in and Around Broiler Chicken Poultry Pens and Farms in Maiduguri, Borno State, Nigeria

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Seasonal Performance Analysis of Broiler Chickens in Commercial vs. Backyard Poultry Farms in Maiduguri, Borno State, Nigeria

Table 2 summarizes the performance metrics of broiler chickens reared in commercial and backyard poultry farms across different seasons: hot dry season, rainy season, and cold dry season. The evaluated metrics include average weight gain, feed intake, feed conversion ratio (FCR), and mortality rate. The average weight of broilers in commercial poultry farms is highest during the rainy season (1700 ± 180 grams), slightly lower in the cold dry season (1600 ± 190 grams), and lowest during the hot dry season (1500 ± 200 grams). A similar trend is observed in backyard poultry farms, though the values are slightly lower. In backyard farms, the average weight of broilers is highest during the rainy season (1400 ± 200 grams), lower during the cold dry season (1300 ± 210 grams), and lowest during the hot dry season (1200 ± 220 grams).

Parameter	Commercial Farms (Hot Dry Season)	Commercial Farms (Rainy Season)	Commercial Farms (Cold Dry Season)	Backyard Farms (Hot Dry Season)	Backyard Farms (Rainy Season)	Backyard Farms (Cold Dry Season)
Average Weight Gain (g)	1500 ± 200	1700 ± 180	1600 ± 190	1200 ± 220	1400 ± 200	1300 ± 210
Feed Intake (kg)	4.0 ± 0.5	4.3 ± 0.4	4.5 ± 0.3	3.0 ± 0.6	3.3 ± 0.5	3.8 ± 0.6
Feed Conversion Ratio	3.0 ± 0.3	2.8 ± 0.2	2.9 ± 0.3	3.2 ± 0.4	3.1 ± 0.3	3.1 ± 0.3
Mortality Rate (%)	8.0 ± 1.0	5.0 ± 0.8	6.0 ± 0.9	12.0 ± 1.5	10.0 ± 1.2	11.0 ± 1.3

Table 2. Seasonal Performance Analysis of Broiler Chickens in Commercial vs. Backyard Poultry Farms in Maiduguri, Borno State, Nigeria

Feed intake in commercial farms also shows seasonal variation. It is highest during the cold dry season (4.5 ± 0.3 kg), slightly lower in the rainy season (4.3 ± 0.4 kg), and lowest during the hot dry season (4.0 ± 0.5 kg). In backyard farms, feed intake is highest in the cold dry season (3.8 ± 0.6 kg), decreases in the rainy season (3.3 ± 0.5 kg), and is lowest during the hot dry season (3.0 ± 0.6 kg).

The table also shows results for feed conversion ratio (FCR), which measures the efficiency of feed utilization. The results reveal that FCR in broiler chickens in commercial farms is best (lowest) during the rainy season (2.8 ± 0.2), slightly higher in the cold dry season (2.9 ± 0.3), and highest during the hot dry season (3.0 ± 0.3). In backyard farms, the FCR is highest during the hot dry season (3.2 ± 0.4), with a slight improvement in both the cold dry season (3.1 ± 0.3) and the rainy season (3.1 ± 0.3). The FCR data indicate that broilers in commercial systems are more efficient in converting feed into body mass compared to those in backyard systems. Both systems demonstrated improved feed efficiency during the rainy season.

Mortality rates in commercial farms are lowest during the rainy season (5.0 ± 0.8%), slightly higher in the cold dry season (6.0 ± 0.9%), and highest during the hot dry season (8.0 ± 1.0%). In backyard farms, the mortality rate follows a similar trend but with higher values: lowest during the rainy season (10.0 ± 1.2%), increasing in the cold dry season (11.0 ± 1.3%), and highest during the hot dry season (12.0 ± 1.5%), as presented in Table 2.

Seasonal Mortality Rates of Broilers Based on Poultry Farming Type in Maiduguri, Borno State

Table 3 presents a breakdown of broiler chicken mortality rates in Maiduguri, Borno State, segmented by season and type of poultry farming (commercial and backyard). The results reveal notable differences in mortality rates between seasons.

In the cold dry season, mortality rates for broilers are comparatively high, with commercial farms showing a 35% mortality rate, while backyard farms exhibit a higher rate of 43%. During the rainy season, mortality rates drop significantly for both commercial and backyard broiler farms. Commercial farms report a mortality rate of 10%, while backyard farms have a slightly higher rate of 12%.

The hot dry season shows the highest mortality rates for broilers, with commercial farms experiencing a 55% mortality rate and backyard farms facing an even higher rate of 68%.

Season	Commercial Mortality Rate (%)	Backyard Mortality Rate (%)
Dry cold	35	43
Rainy	10	12
Dry hot	55	68

Table 3: Seasonal Mortality Rates of Broilers Based on Poultry Farming Type in Maiduguri, Borno State

Discussion

The results of the present study on temperature fluctuations around broiler chicken poultry pens in Maiduguri, Borno State, Nigeria, indicate significant seasonal and temperature variations throughout the year. The highest temperatures occur between April and June, peaking at 40.5°C in May, while the cooler months range from October to February, with January having the lowest average temperature of 27.5°C. These findings have substantial implications for broiler chicken production systems in Maiduguri and similar climates. Previous studies have reported that these

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temperature fluctuations are crucial in understanding the performance and health of broiler chickens, as extreme high temperatures are known to adversely affect feed intake, growth performance, and overall health of broilers (Attia *et al*., 2020; Oke *et al*., 2020; Kpomasse *et al*., 2021). Moreover, heat stress has been revealed to lead to reduced feed consumption as chickens eat less to minimize metabolic heat production (Apalowo *et al*., 2024). Consequently, this impacts their growth rate and feed conversion efficiency, as reported by Nawaz *et al*. (2021) and Ahmad *et al*. (2022). Furthermore, high temperatures can lead to severe health issues and increased mortality rates due to heat stroke, dehydration, higher susceptibility to diseases, and related complications (Wasti *et al*., 2020; Juiputta *et al*., 2023; Apalowo *et al*., 2024). The thermoregulatory system of broilers is less efficient at high temperatures, leading to higher susceptibility to heat stress and associated mortality (Onagbesan *et al*., 2023). On the other hand, the findings of the present study revealed that the cooler months, with temperatures between 27.5°C and 29.0°C, are closer to the ideal thermal comfort zone for broilers described by Dedousi *et al*. (2023), which ranges from 18°C to 24°C. These conditions are conducive to optimal growth performance as they reduce heat stress and improve feed efficiency. The relatively mild temperatures during these months may contribute to lower mortality rates, as previously reported by Apalowo *et al*. (2024). Oke *et al*. (2024), in a similar study, has reported that broilers experience less thermal discomfort and are less prone to heat-related illnesses during mild environmental temperatures.

The findings of the present study reveal a clear seasonal trend in the weight gain of broilers, with the highest average weights recorded during the rainy season and the lowest during the hot dry season. This pattern is consistent across both commercial and backyard farms, although commercial farms report higher overall weights. These results align with those of Kpomasse *et al*. (2021) and Onagbesan *et al*. (2023), who found that the rainy season provides more favorable environmental conditions, such as moderate temperatures and humidity, which reduce heat stress and promote better feed intake and growth. Conversely, the high temperatures during the hot dry season likely induce heat stress, reducing feed intake and growth rates, consistent with the findings of Wasti *et al*. (2020). Additionally, the present study supports the results of Abiola *et al*. (2020) and Sanou *et al*. (2022), who reported the negative effects of high ambient temperatures on broiler performance.

The study also reveals that feed intake varies seasonally, with the highest intake during the cold dry season and the lowest during the rainy season in both commercial and backyard farms. This counterintuitive result could be attributed to the increased energy requirements of broilers to maintain homeostasis during extreme cold, leading to higher feed consumption. These findings support Mancinelli *et al*. (2023), who reported reduced feed intake due to the impact of heat stress on the feeding behavior of fast-growing broiler chickens, indicating that broilers tend to eat less feed and drink more water during hot, dry weather compared to colder conditions.

However, the study also indicates that the efficiency of feed utilization, as indicated by the Feed Conversion Ratio (FCR), is poorest during the hot dry season and best during the rainy season. This implies that feed intake during the hot dry season is not efficiently converted into body mass, likely due to the adverse effects of heat on metabolic processes. Our results agree with Wasti *et al*. (2020) and Goel (2021), who reported that extreme high temperatures can negatively impact gut health and appetite hormone regulation, reducing the feeding capacity of broilers. While Munonye *et al*. (2023) found that broilers eat less when under heat stress caused by high temperatures, they also reported decreased feed intake during the cold season, attributing this to cold stress. They explained that in colder conditions, more energy is used to maintain body heat, resulting in less feed being converted into flesh. In both cases (high or low temperatures), less feed is used for growth. At high temperatures, birds expend energy through panting to stay cool, which deteriorates feed efficiency and results in weight loss (Teyssier *et al*., 2022; Bhawa *et al*., 2023).

The FCR results from the present study reveal that broilers in commercial farms are more efficient in feed utilization compared to those in backyard farms across all seasons. This could be attributed to better management practices, including optimized feed formulations, controlled environments, and access to veterinary care in commercial setups. Backyard farms, on the other hand, might lack these advantages, leading to lower performance metrics, which agrees with the findings of Haruna *et al*. (2018).

Moreover, the best FCRs are observed during the rainy season, with both systems showing improved efficiency compared to the hot dry season. It is well documented that higher temperatures and associated stress during the hot dry season likely impair metabolic efficiency, leading to higher FCRs (Wasti *et al*., 2020; Teyssier *et al*., 2022; Bhawa *et al*., 2023). The slightly better FCR in the cold dry season compared to the hot dry season in this study further emphasizes the negative impact of high temperatures on feed efficiency in broilers.

The findings of the present study revealed significant seasonal and systemic variations in broiler mortality rates, with the lowest rates occurring during the rainy season, moderately high rates during the cold dry season, and the highest rates during the hot dry season. These findings are not consistent with those of Akagha and Nwagbara (2021), who categorized the peak of diseases and mortality in broiler chickens according to season and indicated that the rainy season had the highest mortality rates, followed by the cold dry season. The disparity may be due to differences in study locations; their research was conducted in south-eastern Nigeria, which is more humid with longer rainy seasons and shorter dry seasons compared to our study in the north-eastern region, which has a longer dry season.

During the cold dry season of our study period, mortality rates were relatively high, with backyard farms experiencing a higher rate (43%) compared to commercial farms (35%). The higher mortality in backyard farms is likely due to less controlled environments and fewer resources to manage cold stress effectively. Commercial farms likely benefit from better housing and heating systems that reduce the impact of cold temperatures on broilers. This suggestion aligns with Jeni *et al*. (2021), who documented the impact of different husbandry systems on broiler performance regarding

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susceptibility to disease and immune response.

The rainy season saw a significant drop in mortality rates, with commercial farms reporting 10% and backyard farms 12%. Favorable environmental conditions during this season, such as moderate temperatures and increased humidity, reduce heat stress and support better health in broilers. Ample water availability and potentially richer feed quality during this period may also contribute to lower mortality rates. The findings of the present study agree with Lara and Rostagno (2013) and Wasti *et al*. (2020), who reported a marked increase in broiler mortality as environmental temperature increased. However, our findings contrast with those of Akagha and Nwagbara (2021), who reported higher mortality rates during the rainy season compared to other seasons. Variations in reports of broiler mortality rates from various studies might be attributed to differences in the climatic conditions of the study areas.

The hot dry season of our study period recorded the highest mortality rates, with commercial farms experiencing 55% and backyard farms 68%. Extreme heat during this period is the primary factor driving these high mortality rates. Backyard farms' higher susceptibility to extreme temperatures can be attributed to less effective cooling mechanisms and poorer management practices compared to commercial farms. This suggestion is consistent with the report of Oke *et al*. (2021), who stated that disease challenges and thermal stress are exacerbated by inadequate management and poor housing conditions. The increased mortality recorded during the hot dry season in our study also supports the findings of Juiputta *et al*. (2023), who attributed heat stress to increased susceptibility to diseases and reduced overall resilience in broilers. The higher mortality rates observed in backyard farms compared to commercial farms further emphasize the challenges faced by small-scale farmers, including less effective disease management and poorer environmental controls. Commercial farms consistently report lower mortality rates than backyard farms, likely due to better infrastructure, management practices, and resources to mitigate environmental stresses.

Conclusion

This study clearly demonstrate a pattern of significant temperature fluctuations in Maiduguri, with the hottest period occurring from April to June, peaking in May at an average of 40.5°C. The cooler months span from October to February, with January recording the lowest average temperature of 27.5°C. During the hot dry season, broiler chickens exhibited the lowest average weight gain and highest mortality rates across both commercial and backyard farms. Commercial farms saw a weight gain of 1500 ± 200 grams, while backyard farms reported 1200 ± 220 grams. Mortality rates were alarmingly high, at 55% for commercial farms and 68% for backyard farms. In contrast, the rainy season proved to be the most favorable for broiler performance. Both farming types achieved their highest average weights during this period, with commercial farms at 1700 ± 180 grams and backyard farms at 1400 ± 200 grams. Correspondingly, mortality rates were lowest, at 5.0 ± 0.8% for commercial farms and 10.0 ± 1.2% for backyard farms. The cold dry season presented intermediate results, with weight gains of 1600 ± 190 grams in commercial farms and 1300 ± 210 grams in backyard farms. Mortality rates were slightly elevated compared to the rainy season, at 6.0 ± 0.9% for commercial farms and 11.0 ± 1.3% for backyard farms. Feed intake and feed conversion ratios (FCR) also varied seasonally. In commercial farms, feed intake was highest during the cold dry season (4.5 ± 0.3 kg) and lowest during the hot dry season (4.0 ± 0.5 kg). Backyard farms followed a similar pattern. The FCR data revealed that broilers in commercial systems were more efficient at converting feed into body mass, particularly during the rainy season (FCR of 2.8 ± 0.2), compared to backyard systems, which had the highest FCR during the hot dry season (3.2 ± 0.4).

Recommendations

To improve broiler performance and reduce mortality rates based on the study findings, the following recommendations are suggested: Adjust feeding schedules to cooler times (early morning and late evening) during the hot dry season. Provide high-energy diets during cooler months to support weight gain and maintain optimal feed conversion ratios (FCR). Ensure a constant and clean water supply, especially during the hot dry season. Consider installing automatic drinkers to maintain water availability and quality. Invest in better insulation and temperature regulation infrastructure in both commercial and backyard farms. Encourage adoption of cost-effective cooling and heating solutions in backyard farms to improve their resilience to temperature fluctuations. Implementing modern, efficient temperature control technologies in both commercial and backyard farms can significantly improve broiler performance and reduce mortality rates. Develop training programs for farmers on best management practices to mitigate the effects of temperature extremes. Government and agricultural organizations should support the dissemination of heat-mitigation technologies and practices, possibly through subsidies or technical assistance programs. Ongoing research into climate adaptation strategies, such as developing heat-tolerant breeds and innovative cooling systems, will be vital in addressing the challenges posed by rising global temperatures.

Conflict of interests

The authors declare that there is no conflict of interest

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